

REMARKS

I. Introduction

For the reasons set forth below, Applicant respectfully submits that all pending claims are patentable over the cited prior art references.

II. The Rejection Of Claims 1-12, 16-18 and 21-28 Under 35 U.S.C. § 103

Claims 1-12, 16-18 and 21-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over USP 5,964,653 to Perlov in view of US Pub No. 2004/0005842 to Chen. Applicant respectfully traverses this rejection for at least the following reasons.

Claim 1

Claim 1 recites in part a carrier head having a flexible membrane including a central portion, a perimeter portion, and at least one flap extending from an inner surface of the central portion, the flap including a laterally extending first section and an angled second section extending beneath the first section, wherein an upper surface of the laterally extending first section and a lower surface of the angled second section bound a same chamber of a plurality of chambers.

In the statement of rejection, the Examiner admits that Perlov does not teach a laterally extending first section and an angled section, and Chen is relied upon to cure these deficiencies. Applicant respectfully submits that the proposed combination still does not meet the claimed limitations for reasons set forth below.

Chen describes a carrier head that includes a base 104, a retaining ring 110 and a flexible membrane 108. The flexible membrane 108 extends below and is connected to the base 104 to provide a pressurizable chamber 106 [0030]. The flexible membrane 108 includes a central portion 120 that provides a mounting surface 122 for a substrate, a perimeter portion 124 that extends away from a polishing surface, a flexible extension portion 126 and an inwardly extending flexure 128 that has an inner edge clamped to the base 104 [0033]. As the retaining 110 wears, the attachment point of the flexure 128 to the base 104 shifts closer to a polishing pad used to polish the substrate. As the flexure 128 moves downwardly, the flexure 128 pulls the flexible extension portion 126 inwardly. This reduces the portion of the load area that covers the

perimeter portion 124, thereby reducing the load at the edge of the flexible membrane 108 proportionally [0037].

However, Chen fails to disclose an upper surface of the laterally extending first section and a lower surface of the angled second section that bound a same chamber, as required by claim 1. In particular, the upper surface of the flexure 128 and the lower surface of the flexible extension portion 126 of Chen do not bound the same chamber in a volume between the membrane and the base. Chen provides that the upper surface of the flexure 128 and the lower surface of the flexible extension portion 126 are the exterior surface of the membrane exposed to the environment outside. This is not the boundary of a chamber of a plurality of chambers. In the volume between the flexible membrane and the base, as required by claim 1.

Similarly, while Figs. 3A and 3B of Chen illustrate multiple chambers 344/346, the upper surface of the flexure portion 128 and the flexible membrane extension portion 126 are situated exterior to the chamber 344. This exterior region is not a boundary of a chamber.

Therefore, Applicant respectfully submits that claim 1 is in condition for allowance. Claims 2-21 depend on claim 1, and therefore are submitted to be allowable by virtue of their dependency on claim 1.

Claim 22

Claim 22 recites in part a flexible membrane configured to undergo vertical deflection to react out force components caused by pressure differential between chambers to provide a substantially uniform transition between different pressures in adjacent regions.

In the statement of rejection, the Examiner cites col. 11, lines 48-58 of Perlov as allegedly disclosing these claimed features (see, page 6, lines 4-9 of Office Action).

In this section and neighboring paragraphs thereof, Perlov describes a carrier head assembly that includes independently control of pressures in these chambers 212/214/216 done by the flexible membrane 210 to control the downward pressure applied by membrane portions 292/294/296 of the flexible membrane 210 (11:23-25). The average pressure in chamber 216 can be lower than the average pressure in the other two chambers 212/214 during polishing so as to compensate for over-polishing generated by substrate edge effect caused when the edge of the substrate 10 is polished at a different rate than the center of the substrate 10.

However, Perlov fails to disclose a flexible membrane configured to undergo vertical deflection to react out force components caused by pressure differential between chambers to provide a substantially uniform transition between different pressures in adjacent regions, as recited in claim 22. Perlov does teach independently controlling the pressures to maximize uniformity of polishing. For example, rather than applying a pressure of 8.0 psi to the inner chamber 212 and the middle chamber 214 and a pressure of 6.0 psi to the outer chamber 216, a pressure of 8.0 is applied to the inner chamber 212 and the middle chamber 214 for one minute while the same pressure is applied to the outer chamber 216 for forty-five seconds (12:3-7). However, this merely discloses the same polishing for the different chambers. It is completely unrelated to providing a uniform transition between pressures in different regions. Moreover, Perlov does not disclose that the flexible membrane portions 292/294/296, are configured to react out any force components that are caused by different pressures in the chambers 212/214/216.

Additionally, while Perlov teaches that the pressure in the outer chamber 216 and middle chamber can be increased and reduced respectively (12:27-29), Perlov does not disclose that the associated flexible membrane portions 296 and 294 are configured to vertically deflect in response to the pressure adjustment between the outer chamber 216 and the middle chamber 214. Rather, the inner flap 282a and the middle flap 282b of the flexible membrane 210 are respectively clamped around the inner edge and outer edge of the lower flange 284 secured to the bottom surface 230 of the carrier base 204, which prevents free movements of the flexible membrane portions 296 and 294.

Chen does not cure these deficiencies of Perlov, because Chen does not teach a plurality of chambers, or pressure differential between such chambers, let alone disclose a flexible membrane that is configured to undergo vertical deflection to react out force components caused by such pressure differential between the chambers.

Thus, for at least these reasons, Applicant respectfully submits that claim 22 is in condition for allowance. Claims 23-27 depend on claim 22, and therefore are submitted to be allowable by virtue of their dependency on claim 22.

Claim 28

Claim 28 recites in part a flexible membrane including a flap having a laterally extending first section and an angled second extending beneath the first section, wherein an upper surface of the laterally extending first section and a lower surface of the angled second section bound a same chamber.

However, as discussed *supra*, Chen fails to disclose an upper surface of the laterally extending first section and a lower surface of the angled second section that bound a same chamber, as required by claim 28.

Therefore, for analogous reasons discussed with respect to claim 1, Applicant respectfully submits that claim 28 is in condition for allowance.

III. Conclusion

By responding in the foregoing remarks only to particular positions taken by the Examiner, the Applicant does not acquiesce with other positions that have not been explicitly addressed. In addition, Applicant's arguments for the patentability of a claim should not be understood as implying that no other reasons for the patentability of that claim exist.

For all of the reasons set forth above, it is urged that the application is in condition for allowance, an indication of which is respectfully solicited.

If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicant's representative at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper,

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including extension of time fees, to Deposit Account 06-1050 and please credit any excess fees to such deposit account.

Respectfully submitted,

Date: 1/2/04



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